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Patient Care • Teaching • Research

Gamma Knife for metastatic tumors avoids leukoencephalopathy seen after WBRT

by **Edward A. Monaco, III, MD, PhD**

Metastatic tumors of the brain are the most common form of intracranial tumor, far outnumbering all primary intracranial tumors combined. Traditionally, the management for patients with brain metastases has been fractionated whole brain radiation therapy (WBRT).

Earlier cancer diagnosis and aggressive systemic therapies have improved survival for many cancers but have also raised concerns about the long-term toxicities of treatments. While WBRT treats the brain metastases, it lacks selectivity and exposes most of the normal brain to a therapeutic radiation dose.

Specifically, radiation injures small cerebral vasculature and neuropil. It kills oligodendrocytes, resulting in demyelination, and stunts regeneration via injury to the subependymal stem-cell population. These effects appear to impact the brain's white matter most. More importantly, changes to the health of the brain's white matter have been correlated with neurocognitive dysfunction and dementia.

Recent studies have identified MRI-detectable white matter changes—or leukoencephalopathy—following WBRT in longer-term survivors of brain metastases. Not surprisingly, exposure of increasing volumes of brain tissue to radiation in children results in decreased intelligence.

Unfortunately, study of the neurotoxic effects of WBRT in patients with brain metastases has been limited, most likely due to historically poor long-term survivals in this population.

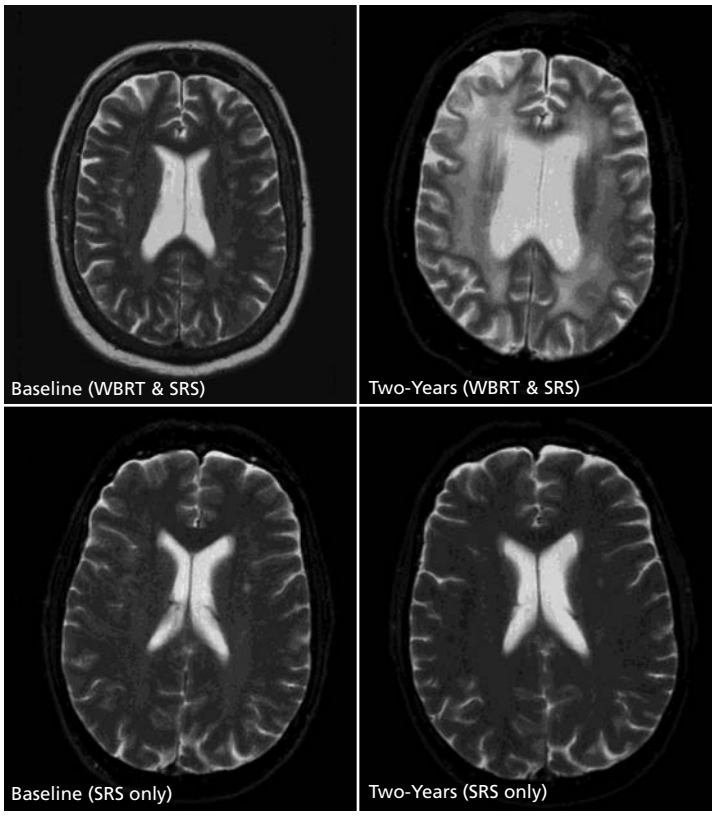
Gamma Knife stereotactic radiosurgery (GKRS) is a highly selective and minimally invasive method of treating intracranial lesions using the focused gamma rays emitted from cobalt sources. GKRS possesses a nearly three decade-long track record at UPMC for the safe and effective treatment of intracranial lesions. Over this time brain metastases have become the most commonly treated lesions.

Unlike WBRT, GKRS delivers a therapeutic radiation dose in a single session to one or multiple tumors with a high dose fall off, thus nearly eliminating unwanted toxic radiation exposure to normal brain tissue.

At the UPMC Center for Image-Guided Neurosurgery there is a strong emphasis on providing the highest quality care, while comparing the benefits and potential toxicities of different treatment strategies. In this context, we reviewed our extensive experience in treating brain metastases with GKRS in an attempt to identify differences in the effects of WBRT and GKRS on the brain's white matter. Specifically, we compared MRI imaging of patients whose brain metastasis therapy included only GKRS with individuals whose therapy included WBRT and GKRS.

To compare these two populations we devised a grading system for the evaluation of white matter changes on T2/FLAIR MRI sequences on the basis of known patterns of radiation injury: grade 1 = little or no white matter hyperintensity; grade 2 = limited periventricular hyperintensity; and grade 3 = diffuse white matter hyperintensity.

At the time of initial treatment, both groups showed little evidence of leukoencephalopathy. However, one year after treatment, over 90% of the patients whose therapy included WBRT manifested grade 2 or 3 leukoencephalopathy. Over 70% of these patients showed grade 3 white matter changes at two years (*figure above*).



T2-weighted magnetic resonance images showing baseline and post-treatment (two years) white matter changes. The upper panels are from a patient treated with WBRT and stereotactic radiosurgery (SRS). Lower panels show representative images from a patient treated with only SRS.

In contrast, only one patient in our series treated with GKRS alone showed any white matter changes, and only to grade 2. Statistical analyses suggested that these differences in the rates of leukoencephalopathy were due to WBRT and not any baseline characteristic of the groups. These findings indicate that the risk of white matter changes following therapy with GKRS alone is significantly less then when WBRT is included.

Not surprising, our observations regarding leukoencephalopathy correspond with the results of a landmark randomized controlled clinical trial demonstrating that an SRS-only approach to brain metastases avoids the neurocognitive toxicity of WBRT.

Our work adds to mounting evidence demonstrating the differential effects of WBRT and GKRS on normal brain structure and function. In general, we favor withholding or even completely avoiding WBRT except in cases of patients harboring miliary disease or carcinomatous meningitis.

To better understand the relationship between white matter change and neurocognitive dysfunction, we will soon be enrolling patients in a multicentered prospective trial to be conducted by the North American Gamma Knife Consortium comparing WBRT plus SRS versus SRS alone for the treatment of brain metastases. Primary outcomes of this study will include neurocognitive and quality of life assessments. •

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CHAIRMAN'S MESSAGE

Progress

At the University of Pittsburgh, our department has been intricately involved in changing neurosurgery. From the development of novel approaches for the treatment of trigeminal neuralgia and hemifacial spasm, to the development of novel approaches to brain and spine radiosurgery, to the development of minimally invasive approaches for skull base tumors. As we look forward, deficiencies in the outcomes of our patients are opportunities for **Progress**.

Opportunities for **Progress** can be classified into several categories. Opportunities to minimize known side effects or complications of our interventions. Opportunities to alter the natural history of neurological diseases. Opportunities to develop completely novel approaches to treat old problems. Opportunities to better assess our outcomes. Opportunities to disseminate our knowledge throughout the world.

As described throughout this issue of our newsletter, a number of key initiatives address opportunities in catalyzing **Progress** and improving patient outcomes. Dr. Edward Monaco eloquently describes advantages of using radiosurgery to reduce detrimental effects of whole brain radiation in patients with metastatic disease. Dr. Peter Gerszten identifies a potential gap in the management of patients with spine disease. His work provides insightful evidence of the importance of not only managing the patient's spine specific signs, symptoms or images, but also demonstrates the importance of managing the patient as a whole, including the psychological impact of their disorder.

Accurate and objective measurement of patient outcomes has been an area of deficiency in neurosurgery. To address this gap, last summer we recruited Dr. Jamie Pardini, an accomplished neuropsychologist who is already making an important difference in our outcome assessment as well as management of psychological issues in our patients.

Finally, Drs. Paul Gardner and Carl Snyderman continue to disseminate throughout the world their novel minimally invasive approaches for the management of skull base pathology.

I am very proud of the culture of **Progress** within our department, and look forward for the Department of Neurosurgery at the University of Pittsburgh to continue to make important contributions aimed at improving the outcomes of our patients.

Robert M. Friedlander, MD, MA
Chairman, Department of Neurological Surgery
UPMC Endowed Professor of Neurosurgery & Neurobiology
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Editor: Peter C. Gerszten, MD, MPH • **Production Editor:** Paul Stanick
Newsletter .pdf archive available at **neurosurgery.pitt.edu/media-resources/neurosurgery-news**
General Phone & Referrals: (412) 647-3685 • **Department e-mail:** neuroinfo@upmc.edu
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Watching over the Penguins

by **Daniel Wecht, MD**

As the National Hockey League and our Pittsburgh Penguins enter another exciting playoff season, it becomes increasingly difficult to recall that it wasn't long ago that many thought that this season wouldn't happen. For several months, NHL owners and the NHL Players' Association could not seem to find common ground. In mid-January—just when all was considered lost—an agreement was reached and the players hit the ice.

Heading into this season, the Penguins made a conscientious decision to bolster their medical staff with an entire team of specialists. Historically, hockey clubs were overseen by a "team doctor," often an orthopedic surgeon, who managed a range of medical issues that might surface throughout a season.

In recent years, professional sports franchises have become an increasingly "big business"—with a correspondingly increased investment in the health and well-being of each and every one of its players. With this recognition, there has developed an understanding that the players should have more specialized medical care available to them in a more timely fashion. As a result, ophthalmologists, otolaryngologists, endodontists and neurosurgeons—as well as others—are all part of the Penguins' medical team.

Dr. Wecht

In Pittsburgh, the Penguins have always had excellent neurosurgical care. For many years, long-time University of Pittsburgh neurosurgeon Peter Sheptak, MD, was the team's neurosurgeon. A few years ago, Dr. Sheptak retired from his clinical practice and handed the reins over to another department neurosurgeon, Douglas Kondziolka, MD.

Dr. Kondziolka handled these duties admirably as the Penguins moved from Mellon Arena to their new home at the Consol Energy Center. Last year, Dr. Kondziolka accepted a new position in New York and is now team neurosurgeon for the Penguin's Atlantic Division rival the New York Rangers. Prior to his departure, Dr. Kondziolka approached my colleague L. Dade Lunsford, MD, and myself and asked if we would accept the responsibility with his departure.

I had prior experience working with professional athletes as a team physician for the Pittsburgh Steelers (alongside my colleague, Joe Maroon, MD,) from 2000–2010, while Dr. Lunsford had been team physician for the University of Pittsburgh football and basketball teams for several years. Dr. Lunsford and I readily agreed to share the neurosurgical duties for the Penguins.

Neurosurgical care for a group of professional hockey players generally involves being quickly available in the event that a player suffers a traumatic head or spinal injury. In a fast moving and hard hitting game such as hockey, significant forces are generated that often lead to significant bodily injury.

Far and away the most common malady that a team neurosurgeon is called upon to assess during the course of a hockey season is concussive head injury. In Pittsburgh, star players Sidney Crosby and Evgeni Malkin (among others) have been treated for concussion.

Recent and improved understanding of the pathophysiology, clinical assessment, and rehabilitation of the concussed athlete allow us provide state of the art care. This often involves a "team approach," drawing on the experience and expertise of specialists such as Christopher Harner, MD, (chief team physician/orthopedics), Michael Collins, MD, (neuropsychology) and Chris Stewart (head trainer). Advanced diagnostic testing, available at any number of UPMC facilities, further enhances our ability to care for injured Penguin players.

Recently, an on-ice injury highlighted the need for immediate and multidisciplinary medical care. In a game against the New York Islanders on March 30, Crosby was struck in the mouth with a deflected slapshot. Aside from a mouth guard that—when worn properly—provides modest coverage of the upper dentition, this is an area of the hockey player's body—the lower face—that is relatively unprotected.

Crosby sustained a significant injury that required the immediate attention of Stewart and timely assessments from Dr. Harner, the team dentist, Steve J. Kukunas, DMD, the team otolaryngologist, Carl Snyderman, MD, MBA, and myself. He was subsequently sent to UPMC Presbyterian where he underwent successful oral and maxillofacial surgery by Bernard J. Costello, MD, DMD.

Timely input from available subspecialists optimizes the care of these oft-injured athletes.

As a native Pittsburgher, I feel particularly privileged to have been given the opportunity to participate in the care of highly skilled athletes who play for our city's professional sports teams. We have been blessed with world class players who have risen to the top of their respective sports. I believe that this environment of achievement inspires those of us who are team doctors to similarly strive to be the best that we can when called upon to care for these "hometown heroes." •

Photos courtesy of the Pittsburgh Penguins

Operating in India

by **Carl Snyderman, MD, MPH, and Paul Gardner, MD**

In January of this year, we had the opportunity to travel to India to participate in anatomic dissection courses and perform live surgery for *Endoneurocon 2013* at the invitation of D.R. Nageswaran, DLO, DN, and K. Selva Muthukumaran, MCh, senior consultants (attendings) at the Meenakshi Mission Hospital in Madurai, India.

After four flights and 25 hours of travel, we arrived in Madurai, located in the southern Indian state of Tamil Nadu. Madurai is a "small" city of a million people and is famous for its temples, in particular, honoring the Hindu goddess Meenakshi.

Meenakshi Mission Hospital is a privately owned hospital providing subspecialty care. Not knowing what resources would be available, we brought a small suitcase packed with key surgical instruments and disposable supplies.

On the day we arrived, 10 potential patients were paraded through the clinic, giving us the opportunity to ask questions about the history, supplement the physical examination, and review radiographs. Patients were selected by us based on the urgency of their condition, endonasal resectability, and duration of surgery.

We operated from sunrise to sunset over the next two days. Leaving no room for complacency, each case had a small surprise waiting for us. The doctors and operating room staff were all very professional and all of the surgeries proceeded without complication. Before leaving Madurai, we rounded on the patients and reviewed the postoperative care with our hosting physicians and felt confident that they could handle any likely complications.

Our next stop was the LTM Medical College and Hospital in Mumbai at the invitation of Drs. Renuka Bradoo and Deepu Bannerji. Their hospital is part of the Fortis health care system, a large international company centered in India.

In addition to an anatomic dissection course, we operated for one day. Surgeries were uneventful and were performed without the aid of intraoperative navigation. An attempt at using a borrowed system failed. Following the surgeries, we were honored to participate in the inauguration of the Fortis Skull Base Tumor Clinic.

Reflecting on our trip, we were impressed by the hospitality of our hosts, the high level of interest in endonasal skull base surgery, and their perseverance in the absence of what we consider standard resources.

(Top), Paul Gardner, MD, and Carl Snyderman, MD, with the surgical team from Madurai including (front row), D.R. Nageswaran, DLO, DNB, Dr. Gardner, Dr. Snyderman, K. Selva Muthukumaran, MCh, and K. Bagathsingh, MS, MCh; (Bottom), Drs. Gardner and Snyderman performing endoscopic endonasal surgery with Dr. Nageswaran assisting.

We learned that we could accomplish complex endoscopic skull base surgeries without the aid of all of the technology that we take for granted: Mayfield head fixation, intraoperative navigation, reliable bipolar electrocautery, neurophysiological monitoring and even endoscopic drill. The most essential technology was topical hemostatic Gelfoam (Surgifoam, Surgiflo, etc.) that was used for cavernous sinus bleeding and direct intraoperative embolization of the aneurysmal bone cysts. Costs must be closely monitored, and even this critical substance was in short supply.

Surgeons in India must be vigilant about the interpretation of pathological and radiological exams. These issues assume even greater importance in skull base surgery, given the variety of unusual pathologies and the complex anatomical relationships.

There is a great need for surgical training in endonasal skull base techniques in India and also great potential for collaboration. We are already planning our next trip and look forward to strengthening our bonds with the surgeons of India and experiencing more of the rich cultural heritage while sharing our techniques and experience.

Follow-up communication with our hosts in India has confirmed that all of the patients we treated have done well. Postoperative imaging is limited with non-contrast CT alone in some patients, but based on these scans, intraoperative impression, and patient outcomes, the goals of surgery were achieved without exception. •

Study looks at co-morbidities in elderly patients undergoing lumbar spine surgery

by **Peter C. Gerszten, MD, MPH**

Degenerative lumbar spinal stenosis and spondylolisthesis are the most common reasons for lumbar surgery in adults over the age of 65 in the United States. These surgeries account for over $ 1 billion in Medicare expenses and over 40,000 procedures annually. Rates of spine surgery in the elderly have increased dramatically over the past decade. There is a growing body of literature supporting the role of surgical intervention for older adult patients with degenerative spinal disorders, such as lumbar stenosis and degenerative lumbar spondylolisthesis.

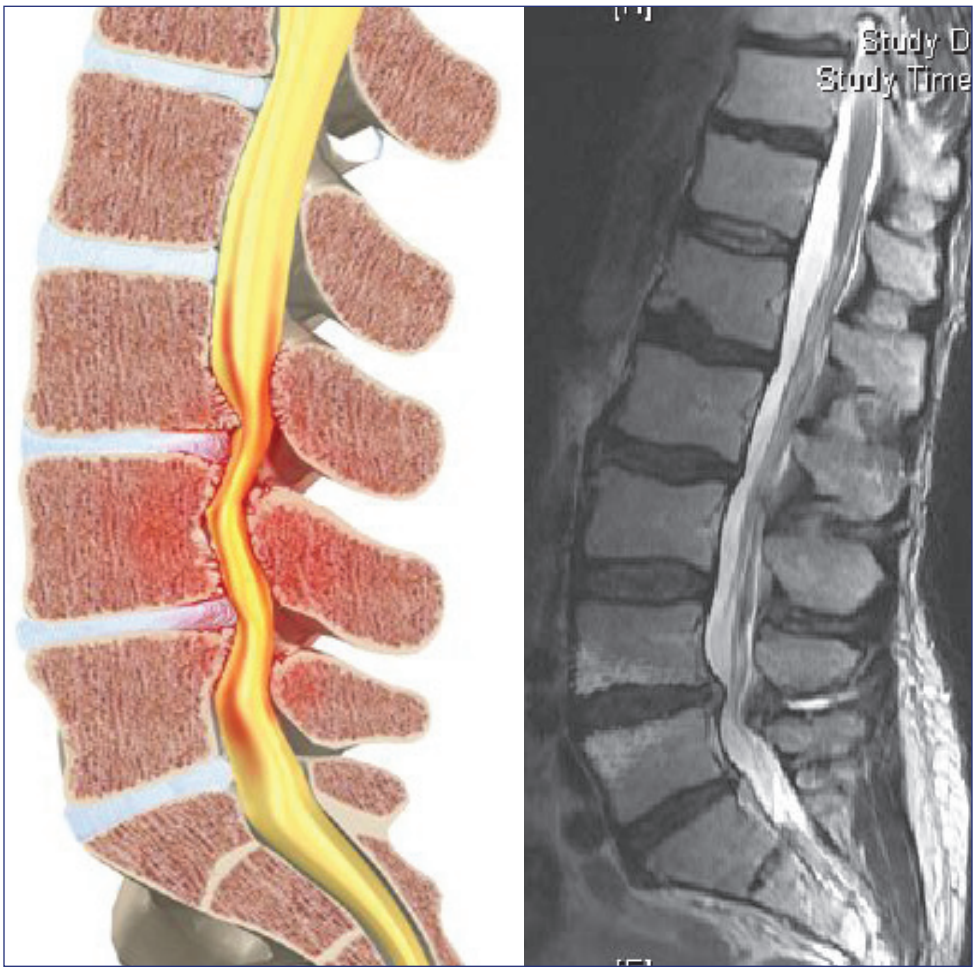
Despite an uncomplicated surgical experience, many of these elderly individuals continue to experience persistent pain and disability that is often difficult to explain. Potential contributors to the suboptimal outcomes include these patients' greater burden of co-morbid muscular skeletal conditions, psychosocial stressors, and neuropsychiatric and cognitive co-morbidities. One proposed reason for surgical failure in older adults is the presence of medical, psychiatric, and neurocognitive co-morbidities, although well controlled investigations are lacking. A substantial body of literature supports the adverse impact of psychiatric conditions, particularly mood and anxiety disorders, on post-surgical outcomes of patients treated for chronic low back pain. Additionally, other non-spine painful conditions that are common among late-life populations may contribute to ongoing low back pain. These include such non-surgically treated conditions such as hip osteoarthritis, fibromyalgia, myofascial syndrome, sacroiliac joint disease, as well as subtle cognitive impairments that interfere with normal descending inhibition of pain.

To date, there has been little effort to evaluate the specific effect of co-morbid physical, mental, and cognitive health co-morbidities on clinical outcome after surgical intervention in older adults. Identifying key factors that predict surgical failure is a key step to providing more thoughtful and less morbid intervention for these patients.

Research in the department of neurosurgery with collaboration from members of the departments of geriatrics, physical medicine and rehabilitation, and psychiatry—including Jordan F. Karp, MD, and Debra K. Weiner, MD— are investigating the relationships between preoperative neuropsychiatric co-morbidity and outcome of surgical correction of lumbar spinal stenosis and spondylolisthesis in older adults. To date, 50 patients have been enrolled in this prospective cohort investigation. All patients undergo a pre-operative evaluation including measures of depression, anxiety, ambulatory ability, pain, disability, cognition, and medical co-morbidity. Three months after surgery, a follow-up evaluation is performed. Our initial experience has determined that the overall satisfaction with the operation, pain relief, and ability to walk following surgery has been described as "very satisfied." This is a significant improvement in anxiety, depression and pain.

This pilot study suggests that elderly patients can be successfully enrolled, evaluated, and followed for neuropsychiatric co-morbidities that may influence the response to lumbar spinal surgery. Pre-operative neuropsychiatric diagnosis and intervention may translate into an improvement in post-surgical functional rehabilitation and decrease in poor outcomes. In general, rates of depression and anxiety have been lower than expected. Functioning, balance, and strength were outcomes in which patients may require both pre-operative counseling to address expectations and focus rehabilitation post-surgery. With continued enrollment and larger sample size, correlations between pre-surgery variables with satisfaction and rate of complications will be described. Differences in these poor outcomes between those with and without clinically significant symptoms of depression and anxiety will hopefully be determined.

The ultimate goal of such studies is to make sure that our patients who undergo surgery have the best possible clinical outcomes. Furthermore, such collaboration between our department and other departments gains a better appreciation for the multidisciplinary approach to patients with these complex conditions in elderly patients. For further information about the trial, please contact us at (412) 647-1700. •



Left: Artist depiction of lumbar stenosis demonstrating a compression of the nerves of the cauda equina. Right: MRI of a patient demonstrating classic degenerative lumbar stenosis at the L4-5 level.

Neuropsychological assessment very useful in optimizing follow-up patient care

by **Jamie Pardini, MD**

As part of the department's dedication to providing patient-focused care, the patient's neurosurgeon, neurologist, primary care provider, or other medical professionals can now request a neuropsychological assessment.

The typical neuropsychological assessment acquires data about a patient's memory, attention, processing speed, language, and executive functions, among other cognitive data. The assessments may be as brief as one hour, or as extensive as a full day.

Assessments are tailored to the physician's request, patient diagnosis, and patient ability to tolerate testing procedures. Patients also may undergo neuropsychological evaluation as one component to help determine candidacy for certain surgical procedures.

A presurgical neuropsychological evaluation quantifies and characterizes any difficulties with cognitive function, and acts as a presurgical baseline to be used for comparison once the surgical procedure is completed.

Following surgery, patients may be assessed if they report even mild cognitive differences during recovery.

The Epilepsy Surgery program is an excellent model of interdisciplinary collaboration that was created to provide comprehensive care for patients before and after surgery to treat medically intractable epilepsy.

Neuropsychological testing historically has been used as a detailed presurgical investigation of a patient's cognitive strengths and weaknesses that may help to localize the seizure focus and correlate with brain areas that are targeted for resection. Patterns of neuropsychological test performance may also be used to help lateralize brain functions, for example, language.

The neuropsychological report places a prominent role in our weekly epilepsy case conference, where data acquired from clinical evaluation, video-EEG studies in the Epilepsy Monitoring Unit, and cutting-edge imaging techniques such as MEG, SPECT, PET, or fMRI analyses are combined and reviewed to determine the best course of action for patient care and seizure control.

Recently, the program has been able to provide more detailed follow-up of all epilepsy surgery patients. At present, it is standard of care to provide a patient interview and brief neuropsychological evaluation of patients at the six-week post-surgical mark. We developed this plan of care as a way to follow patient progress, after wounds have healed and staples have been removed. Thus far the program has provided over twenty six-week post-surgical evaluations.

As a program, we have found that this service is of great benefit to the patient, the patient's family, and their physician care team.

In this evaluation, we obtain a symptom update, assess daily living functioning, and screen for any patient-reported problems or concerns. We then obtain a brief (two-hour) evaluation of memory, attention, processing speed, executive function, and mood function, which can be compared to the longer battery acquired during the presurgical phase.

This information and extra step for patient care has allowed us to quickly identify any issues and provide targeted referrals, including speech therapy/cognitive rehabilitation to treat subtle cognitive changes, and psychotherapy to help patients and their loved ones adjust to any changes in their health status. The detailed information has also been very useful in providing insight about return to work, return to driving, return to schooling, etc.

We are currently expanding this comprehensive model to other neurosurgical subspecialties, such as deep brain stimulation. •

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Sekula to Direct Cranial Nerve Disorders Program

Raymond Sekula, Jr., MD, an internationally known expert for his development of microvascular techniques utilized in the treatment of trigeminal neuralgia, hemifacial spasm, and other cranial neuralgias, was recently named to head the department's Cranial Nerve Disorders Program.

Dr. Sekula's procedures have provided patients with improved outcomes, reduced complications and easier recoveries. He has also developed a novel procedure for Chiari malformation performed through a one-inch incision, affording patients a minimal one- or two-day hospital stay after the procedure.

Dr. Sekula has also been recognized with numerous honors, including The Trigeminal Neuralgia Association Fellowship Award and *Pittsburgh Magazine's* "40 Under 40" Award.

Jovin, Jankowitz to Lead Neuroendovascular Therapy

Tudor Jovin, MD, assistant professor of neurology, neurological surgery and radiology at the University of Pittsburgh, has been appointed to head the UPMC Center for Neuroendovascular Therapy.

Dr. Jovin was one of the first stroke neurologists trained in interventions and he has rapidly become one of the leaders in the field with respect to experience, research and publications. He serves as vice president (president elect) for the Society of Vascular and Interventional Neurology and holds leadership positions in several other national organizations.

Dr. Jovin has been practicing as a board certified vascular neurologist and staff neurointerventionalist at UPMC Presbyterian, UPMC Shadyside and UPMC Mercy since 2004. In 2010, he was appointed director of the UPMC Stroke Institute.

Also, **Brian Jankowitz, MD**, assistant professor of neurological surgery, will assume the role of co-director of the UPMC Center for Neuroendovascular Therapy and direct the department's neuroendovascular fellowship program.

Dr. Jankowitz completed his neurosurgery residency at the University of Pittsburgh in 2011 and immediately joined the department and the UPMC Center for Neuroendovascular Therapy as an assistant professor.

Altschuler Named Chief of Neurosurgery at UPMC Mercy

Eric Altschuler, MD, clinical assistant professor of neurological surgery at the University of Pittsburgh, was recently named chief of neurosurgery at UPMC Mercy. Dr. Altschuler, an expert in spine surgery and neurosurgical trauma, has been an active member of the UPMC Mercy medical staff since 1991 when he graduated from the University of Pittsburgh neurological surgery residency program.

Dixon Installed as Neurotrauma Chair

C. Edward Dixon, PhD, professor of neurological surgery, anesthesiology, neurobiology, physical medicine and rehabilitation, was formerly installed as the Neurotrauma Chair in Neurological Surgery at the University of Pittsburgh, March 18, in a ceremony presided over by Arthur S. Levine, MD, University Senior Vice Chancellor for the Health Sciences and Dean of the School of Medicine.

Dr. Dixon, a world leader in traumatic brain injury research, is also the department's vice chair of research and is director of the university's Brain Trauma Research Center.

Pollack Named Recipient of 2013 McEllroy Award

Ian F. Pollack, MD, Walter E. Dandy Professor of Neurological Surgery at the University of Pittsburgh and chief of pediatric neurosurgery at Children's Hospital of Pittsburgh, has been selected as the 2013 recipient of the University of Pittsburgh William S. McEllroy Distinguished Resident Award.

The McEllroy Award is presented annually by the university's Medical Alumni Association to an outstanding non-alumnus who undertook residency training at the University of Pittsburgh.

Dr. Pollack, a 1991 graduate of the University of Pittsburgh's neurological surgery residency program, is a world renown expert in pediatric neurosurgical care and a leader in brain tumor research.

The award honors the accomplishments of Dr. McEllroy, dean of the School of Medicine from 1938 to 1958, whose vision and efforts transformed the school into a world-class research institution. He vigorously pursued funding for research programs and recruited leading scientists such as Dr. Benjamin Spock and Dr. Jonas Salk.

The award will be presented at the medical alumni association's alumni reunion, May 17, at the Pittsburgh Athletic Association.

Department Faculty Recognized as 'America's Favorite'

Nine doctors from the University of Pittsburgh Department of Neurological Surgery were recently selected among 'America's Favorite Doctors' in a patient survey conducted by patientschoice.org. Doctors recognized include: **Robert M. Friedlander, MD, Paul A. Gardner, MD, Stephanie Greene, MD, Brian T. Jankowitz, MD, Adam S. Kanter, MD, L. Dade Lunsford, MD, Joseph C. Maroon, MD, David Okonkwo, MD, PhD**, and **Ian F. Pollack, MD**.

According to the organization's website, "PatientsChoice.org was created to showcase the best doctors in your area who have been recognized and awarded for outstanding patient care and expertise."

In the News

• **R. Mark Richardson, MD, PhD**, was featured in a front-page *Pittsburgh Post-Gazette* article, March 17, talking about how deep brain stimulation—performed in an MRI instead of in an operating room—helped bring a patient's Parkinson's disease under control.

• **Robert M. Friedlander, MD**, was featured in a *Physician's Weekly* online article, February 17, that dealt with treatment options for cerebral aneurysms.

New Research Projects

• "Probing the Temporal Dynamics of Aberrant Neural Communication and its Relation to Social Processing Deficits in Autism Spectrum Disorders." PI: **Avniel Ghuman, PhD**, $59,973, Brain and Behavior Research Foundation/NARSAD.

Congratulations

• **Miguel E. Habeych, MD, MPH**, was appointed fellow of the American Clinical Neurophysiology Society (ACNS) at the organization's 2013 annual meeting in Miami this past February.

Welcome

• **Patti Williams, RN**, endovascular nurse for Drs. Jovin and Dr. Jankowitz; **Ann Wilkinson RN**, nurse for Dr. Sekula. •

UNIVERSITY of PITTSBURGH
neurosurgery news

Department of Neurological Surgery
University of Pittsburgh Medical Center
UPMC Presbyterian/Suite B-400
200 Lothrop Street
Pittsburgh, PA 15213
(412) 647-3685
neuroinfo@upmc.edu

www.neurosurgery.pitt.edu

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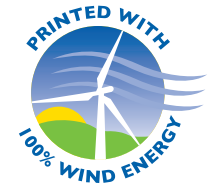

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Manual aspiration thrombectomy safe option in endovascular stroke treatment

by **Brian Jankowitz, MD**

Stroke is one of the leading causes of death in the United States. One of the most common forms of ischemic stroke, large vessel intracranial occlusive disease (LVO), harbors a very poor prognosis. Only 25% of patients with middle cerebral artery occlusions can expect to live independently, with more proximal occlusions predicting an even worse outcome.

Recanalization is the strongest predictor of outcome after acute occlusion of large intracranial arteries. IV tPA is approved for acute ischemic stroke; however, it has limitations including a short therapeutic window and poor reperfusion rates in the setting of extensive clot burden. Endovascular therapy, particularly mechanical clot retrieval devices, can achieve high recanalization rates. These new endovascular techniques have been shown to have superior recanalization rates compared to medical management or older devices.

Manual aspiration thrombectomy (MAT) is a well-established technique in the coronary literature; however, there is little experience with this technique in endovascular stroke therapy. At the University of Pittsburgh, we have pioneered and applied this fairly novel technique in large scale.

MAT involves advancing a large hollow tube or catheter into the thrombus and then simply aspirating the clot with a syringe. The benefits of such a technique include speed, simplicity, and cost effectiveness.

The main drawback of this procedure is that it can sometimes be difficult to advance large catheters into the cerebrovasculature. Fortunately, members of our department are teaming with faculty at the University of Pittsburgh Department of Bioengineering to improve these catheters. We recently published our successful experience with MAT when it is used as an adjunctive therapy to other endovascular techniques in close to 200 patients. The main criticism of this publication focused on the necessity of adjunctive devices to facilitate advancing the catheters into the brain, which increased cost and questioned the effectiveness of pure manual aspiration.

At the recent International Stroke Conference held in Hawaii in January, we reported our experience in 55 patients between 2010 through 2013 where MAT was performed without any adjunctive endovascular therapy. Target vessel occlusion in this series was as follow: MCA-M1: 70%, ICA terminus: 18%, basilar artery: 12%. The median procedure time was 75 minutes. Although this is a small series and has its limitations, the results are comparable to other major endovascular trials with close to 90% recanalization rates and close to 50% good clinical outcomes.

MAT provides an alternative safe option in the armamentarium of endovascular treatment modalities for acute stroke. In experienced hands, this technique can achieve high recanalization rates quickly, which is an important factor considering the concept of "time is brain". The technique is also readily available and cheap, which takes precedence when considering applying MAT outside the United States. •